HIGH SCHOOL AND UNIVERSITY
MATRICULATION EXAMINATIONS BOARD.

DEPARTMENTAL EXAMINATIONS, 1935.

ALGEBRA 3.
(Crawford)

Time—$2\frac{1}{2}$ hours.

Values.

1. Attempt *three* of the following:

8 (*a*) How many terms of the series $24+21+18+\ldots.$ must be taken that the sum may be 105? Explain why two answers are possible.

8 (*b*) Find the sum of 10 terms of the following series:
$\frac{1}{3} - \frac{1}{2} + \frac{3}{4} + \ldots\ldots$
What is the limit of the sum when the number of terms is increased indefinitely?

8 (*c*) Insert four harmonic means between $\frac{2}{17}$ and 1.

8 (*d*) Sum to n terms the series
$1.2 + 2.3 + 3.4 + 5.6 + \ldots\ldots$

2. Attempt *two* of the following:

8 (*a*) Sum to n terms the series $1 + 3 + 7 + 15 + \ldots$

8 (*b*) Eliminate x, y and z from the following equations:

$$ax + by + cz = 0.$$
$$bx + cy + az = 0.$$
$$cx + ay + bz = 0.$$

8 (*c*) If $\frac{s + 2t}{4s - t} = 2$, find the ratio of s to t.

9 **3.** If y varies as the algebraic sum of two terms, one of which varies as x and the other as the square of x; and if $y = -\frac{1}{2}$ when $x = 3$, and $y = -1\frac{1}{3}$ when $x = -2$, find the values of x which make $y = -4$.

Values.

4. Attempt *two* of the following:

8 (*a*) How many diagonals can be drawn in a polygon of 15 sides?

8 (*b*) In how many ways can 3 letters be posted in 5 letter-boxes?

8 (*c*) In how many ways can 4 cards of which two only are aces be drawn from a pack?

5. Attempt *three* of the following:

8 (*a*) Find the general term in the expansion of $(1 - x)^{-2}$.

8 (*b*) Find the sum of the coefficients in the expansion of $(1 + 2x)^5$, and the middle term in the expansion of

$$\left(x - \frac{1}{x}\right)^8$$

8 (*c*) In how many ways can a boy select a dozen marbles in a shop where there are five kinds for sale?

8 (*d*) Find the first approximation to

$$\frac{1 + x}{(1 - 3x)^5}$$

11 **6.** A town borrows $12,000 at 5%, to be repaid in 20 equal annual instalments. Find the annual payment.

100